

Claims

1. A seatback (2) for a vehicle seat (1), having an integrated protective device (4, 5, 6, 7, 8, 9, 10, 11, 12, 13) against accident-related injuries to a seat user in the event of a rear-end impact, in particular against cervical vertebra syndrome or acceleration trauma, having a lower back part (4) joined to a seat part (3) and having a upper back part (5) that is pivotable relative to the lower back part (4) out of a normal use position, about an axis (X-X) extending in the seatback (2) transversely to the longitudinal vehicle axis, through an angular range in a pivoting direction (S) pointing in the direction of travel (F), as a result of a torque (M) acting in the pivoting direction (S), into a safety position, the protective device (4, 5, 6, 7, 8, 9, 10, 11, 12, 13) comprising at least the following parts:
 - a device (6) that, irrespective of any occupancy of the vehicle seat (1), generates the torque (M) acting in the pivoting direction (S) on the upper back part (5);
 - means (7) for detecting a rear-end impact that are in effective connection (U, B) with the torque-generating device (6) in such a way that the device (6) is activated in the event of the rear-end impact and the pivoting motion is initiated; and
 - immobilization means (9) for retention (A) of the upper back part (5) in the normal use position, the immobilization means (9) being constituted by a lever system, and the means (7) for detecting a rear-end impact being in effective connection (U) with the immobilization means (9) for retention (A) of the upper back part (5) in the normal use position in such a way that in the event of the impact, the retention (A) of the upper back part (5) in the normal use position is nullified.
2. The seatback as defined in Claim 1,

wherein there is attached in or on the upper back part (5) a headrest (8) which in the event of a rear-end impact is moved out of a comfort position, in which its spacing (A1) from a seat user's head is approximately 40 to 110 mm, into an interception position, in which its spacing (A2) from a seat user's head is zero or almost zero.

3. The seatback as defined in Claim 1 or 2, wherein the means (7) for detecting a rear-end impact are constituted by a vehicle crash sensor, such as an acceleration sensor.
4. The seatback as defined in one of Claims 1 through 3, wherein the torque-generating device (6) is constituted by a force storage device or energy storage device.
5. The seatback as defined in one of Claims 1 through 4, wherein the torque-generating device (6) is constituted by a preloaded spring element or multiple preloaded spring elements.
6. The seatback as defined in Claim 5, wherein the spring element is constituted by a torsion spring (6a) arranged preferably in the pivot axis (X-X).
7. The seatback as defined in Claim 5 or 6, wherein the means (7) for detecting a rear-end impact are in effective connection (U) with the immobilization means (9) for retention (A) of the upper back part (5) in the normal use position, and immobilization means (9) are in effective connection (B) with the torque-generating device (6), in such a way that in the event of the impact, the preloaded spring element, in particular the torsion spring (6a), is released by the immobilization means (9).
8. The seatback as defined in one of Claims 1 through 7,

characterized by immobilization means (10) for retention (K) of the upper back part (5) against a backward motion out of the safety position into the normal use position.

9. The seatback as defined in one of Claims 1 through 8, wherein the lever system of the immobilization means (9) for retention (B) of the upper back part (5) in the normal use position is constituted by at least two coacting levers (9a, 9b).
10. The seatback as defined in one of Claims 1 through 9, wherein the lever system of the immobilization means (9) for retention (A) of the upper back part (5) in the normal use position comprises an interlock lever (9h) joined immovably to the upper back part (5), in particular via a holder (11) to a crossmember (5a) of the back part (5), and to the torque-generating device (6), in particular comprises an angled lever, pivotable about the pivot axis (X-X) of the upper back part (5), that is secured in a locked position by a locking bolt (9i).
11. The seatback as defined in Claim 10, wherein in the locked position, the locking bolt (9i) engages through an, in particular, elongated opening (9k) of the interlock lever (9h), out of which it is moved in order to release the torque-generating device (6).
12. The seatback as defined in Claim 10 or 11, wherein the interlock lever (9h) is joined to the torsion spring (6a) via a recoil lock (13) that blocks any pivoting of the upper back part (5) in the direction (S) out of its normal use position into its safety position, but permits it in the opposite direction.
13. The seatback as defined in Claim 12, wherein the recoil lock (13) is embodied as a self-locking rolling-element or wedge-type lock, operating positively or nonpositively, preferably by jamming, or as a ratchet device, in such a way that it

makes possible immobilization even in positions located between the safety position and the normal use position of the upper back part (5).

14. The seatback as defined in one of Claims 1 through 9, wherein the lever system is constituted by a pawl (9a), mounted pivotably in the upper back part (5), in particular in a crossmember (5a) of the back part (5), which in a locked position braces against a counterbearing (4c) that is stationary relative to the upper back part (5); and by a pivotably mounted immobilization lever (9b) that in a locked position engages into the pawl (9a), and in a release position releases the pawl (9a).
15. The seatback as defined in one of Claims 1 through 14, wherein the lever system is mounted in side walls of a pocket-like holding part (6b) arranged in the upper back part (5).
16. The seatback as defined in Claim 14 or 15, wherein the counterbearing (4c) is arranged at an upper end of a support part (4d) that is immovably joined at the other end to the lower back part (4) and preferably projects into the pocket-like holding part (6b), and is constituted by a stop surface for a lobe (9d) of the pawl (9a) arranged approximately at an unattached lever end.
17. The seatback as defined in one of Claims 14 through 16, wherein a motion of the immobilization lever (9b) out of its locked position into its release position is brought about by means of an electromagnet which receives its switching pulse from a sensor constituting the means (7) for detection of the rear-end impact.
18. The seatback as defined in one of Claims 8 through 17, wherein the immobilization means (10) for retention (K) of the upper back part (5) against a backward motion out of the safety position into the normal use position are respectively embodied as a self-locking rolling-element or wedge-type lock that operates positively and/or

nonpositively, preferably by jamming, or as a ratchet device, the immobilization means (10) preferably making possible immobilization against a backward motion even in positions located between the safety position and the normal use position of the upper back part (5).

19. The seatback as defined in one of Claims 8 through 18, wherein the immobilization means (10) for retention (K) of the upper back part (5) against a backward motion out of the safety position into the normal use position is configured as a snap-locking ratchet mechanism having at least one, preferably two ratchet tooth sets (10b, 10c) attached in particular within the pocket-shaped holding part (6b), and having at least one, preferably two teeth (4e, 4f) functioning as counterpart ratchet elements, arranged in particular on the support part (4d).
20. The seatback as defined in one of Claims 8 through 18, wherein the immobilization means (10) for retention (K) of the upper back part (5) against a backward motion out of the safety position into the normal use position are configured as a rolling-element locking device which comprises a ring gear (10d), arranged concentrically about the pivot axis (X-X) of the upper back part (5), that is arranged inside a cylindrical shell (10e), as well as rolling elements (10g) arranged between the teeth (10f) of the ring gear (10d) and between the ring gear (10d) and the shell (10e).
21. The seatback as defined in one of Claims 8 through 18, wherein the immobilization means (10) for retention (K) of the upper back part (5) against a backward motion out of the safety position into the normal use position are configured as a recoil lock that comprises a cylindrical inner part (10i), arranged concentrically about the pivot axis (X-X) of the upper back part (5), that is arranged within a shell part (10l), as well as rolling elements (10g) or jamming wedges (10m) arranged in receptacles (10k) of the shell part (10l).

22. The seatback as defined in one of Claims 8 through 18, wherein the immobilization means (10) for retention (K) of the upper back part (5) against a backward motion out of the safety position into the normal use position are configured as a recoil lock that comprises a cylindrical inner part (10i) having a smooth enveloping surface or one structured to increase friction or equipped with a coating, and an eccentrically mounted pivoting body (10n) engaging nonpositively on the enveloping surface of the inner part (10i).
23. The seatback as defined in one of Claims 8 through 18, wherein the immobilization means (10) for retention (K) of the upper back part (5) against a backward motion out of the safety position into the normal use position are configured in such a way that the immobilization means (10) limit any recoil play of the upper back part (5), i.e. any backward motion opposite to the pivoting direction (S) in the direction of the normal use position, to a maximum angular magnitude of 1 degree.
24. The seatback as defined in one of Claims 1 through 23, wherein the means (7) for detecting a rear-end impact are in effective connection (U) with the immobilization means (9) for retention (A) of the upper back part (5) in the normal use position, and the immobilization means (9) are in effective connection (B) with the torque-generating device (6), in such a way that in the event of the impact, a release of the torque-generating device (6) is accomplished by the immobilization means (9), in particular by way of the/a interlock lever (9h), by means of a pyrotechnic device (12), preferably by means of a priming cartridge.

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